CLAIMS

We Claim:

1. A pigment dispersion, comprising at least a pigment, an aqueous medium, a copolymer resin between a hydrophobic monomer and a hydrophilic monomer, and a urethane resin.

2. The pigment dispersion according to claim 1, wherein said copolymer resin and said urethane resin have a weight ratio (former/latter) in a range of 1/2 to 2/1.

3. The pigment dispersion according to claim 1, wherein the content of said copolymer resin is in a range of 10 to 50 parts by weight per 100 parts by weight of said pigment, and the content of said urethane resin is in a range of 10 to 40 parts by weight per 100 parts by weight of said pigment.

4. The pigment dispersion according to claim 1, wherein said copolymer resin has an acid value in a range of 50 to 320.

5. The pigment dispersion according to claim 4, wherein said urethane resin has an acid value in a range of 10 to 300.

6. The pigment dispersion according to any of claims 3 through 5, wherein said copolymer resin and said urethane resin have a weight ratio (former/latter) in a range of 1/2 to 2/1.

7. The pigment dispersion according to any of claims 1 through 6, wherein said copolymer resin is at least one of a styrene-(meth)acrylic acid copolymer resin, a styrene-methylstyrene-(meth)acrylic acid copolymer resin, a styrene-maleic acid copolymer resin, a (meth)acrylic acid-(meth)acrylic acid ester copolymer resin, and a styrene-(meth)acrylic acid-(meth)acrylic acid ester copolymer resin.

8. The pigment dispersion according to any of claims 1 through 7,

wherein said urethane resin has urethane linkages and/or amide linkages, and acidic groups.

9. The pigment dispersion according to any of claims 1 through 8, wherein the weight ratio between a solid component of said pigment and non-pigment solid components (former/latter) is in a range of 100/20 to 100/80.

10. The pigment dispersion according to any of claims 1, 2, and 4 through 9, wherein the content of said copolymer resin is in a range of 10 to 50 parts by weight per 100 parts by weight of said pigment, and the content of said urethane resin is in a range of 10 to 40 parts by weight per 100 parts by weight of said pigment.

11. The pigment dispersion according to any of claims 1 through 3, and 6 through 10, wherein said copolymer resin has an acid value in a range of 50 to 320, and said urethane resin has an acid value in a range of 10 to 300.

12. The pigment dispersion according to any of claims 1 through 11, wherein said copolymer resin has a weight average molecular weight (Mw) in a range of 2,000 to 30,000, and said urethane resin has a weight average molecular weight (Mw) in a range of 100 to 200,000.

13. The pigment dispersion according to any of claims 1 through 12, wherein said copolymer resin has a glass transition temperature (Tg; measured in accordance with JIS K6900) of at least 30°C, and said urethane resin has a glass transition temperature (Tg; measured in accordance with JIS K6900) in a range of −50 to 200°C.

14. The pigment dispersion according to any of claims 1 through 13, wherein said copolymer resin has a maximum particle diameter of not more than 0.3 μm, and said urethane resin has a maximum particle diameter of not more than 0.3 μm.

15. The pigment dispersion according to any of claims 1 through 14, wherein said pigment is an organic pigment.

16. The pigment dispersion according to any of claims 1 through 15, wherein said pigment is a pigment that has been subjected to kneading treatment.

17. The pigment dispersion according to any of claims 1 through 16, wherein said pigment is a pigment that has been prepared using a bead mill or an impact jet mill.

18. The pigment dispersion according to any of claims 1 through 17, wherein the pigment dispersion has been subjected to ion exchange treatment or ultra-filtration.

19. The pigment dispersion according to any of claims 1 through 18, wherein an epoxy resin having a glycidyl ether as a backbone thereof, or a resin having oxazoline groups has been added to the pigment dispersion as a crosslinking agent.

20. The pigment dispersion according to claim 19, wherein said crosslinking agent is a resin that reacts with carboxyl groups.

21. The pigment dispersion according to claim 19 or 20, wherein the amount added of said crosslinking agent is in a range of 1 to 50 wt% relative to said urethane resin.

22. The pigment dispersion according to claim 21, wherein said urethane resin has a weight average molecular weight (Mw) after reaction with said crosslinking agent of at least 10,000.

23. The pigment dispersion according to any of claims 19 through 22, wherein the amount added of said crosslinking agent is such that an effective solid component weight ratio (weight of crosslinking agent / (total weight of copolymer resin between hydrophobic monomer and hydrophilic monomer, and urethane resin))

is in a range of 0.5/100 to 50/100.

24. An ink composition, containing at least the pigment dispersion according to any of claims 1 through 23, and an aqueous medium.

25. The ink composition according to claim 24, wherein said aqueous medium contains a penetrating solvent, a wetting solvent, and/or a surfactant.

26. The ink composition according to claim 25, wherein said penetrating solvent is an alkanediol and/or a glycol ether.

27. The ink composition according to claim 25 or 26, wherein said wetting solvent is a polyhydric alcohol.

28. The ink composition according to any of claims 25 through 27, wherein said surfactant is acetylenic glycol and/or a polysiloxane.

29. The ink composition according to any of claims 24 through 28, characterized by further containing an alkanolamine or an alkylamine as a pH adjuster

30. The ink composition according to any of claims 24 through 29, wherein the ink composition has a pH of at least 8.0, a pigment maximum particle diameter of not more than 0.3 μm, and a pigment 50% cumulative dispersed diameter of not more than 0.15 μm.

31. The ink composition according to any of claims 24 through 30, wherein the content of said pigment is not more than 10 wt% of the ink composition.

32. An ink set, comprising at least the ink composition according to any of claims 24 through 31.

33. A method of manufacturing a pigment dispersion, comprising:

a pretreatment step of making a pigment particle diameter minute and uniform through kneading treatment or chipping treatment;

a dispersion step of adding a copolymer resin between a hydrophobic

monomer and a hydrophilic monomer, and then dispersing the pigment using a bead mill or an impact jet mill; and

an after-treatment step of further adding a urethane resin and a crosslinking agent and carrying out crosslinking treatment.